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SCIENCE NEWS LETTER

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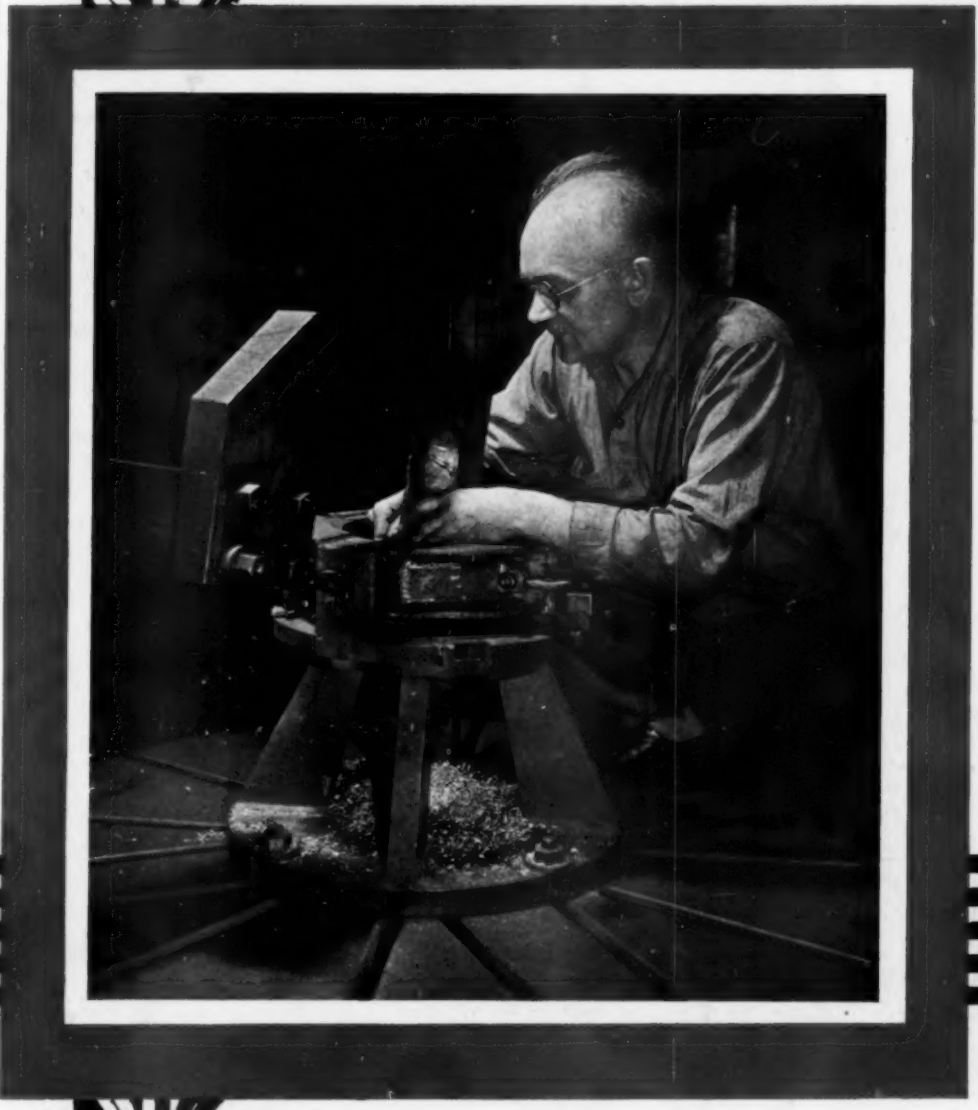
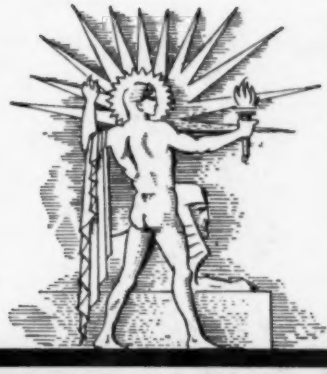
THE WEEKLY SUMMARY OF CURRENT SCIENCE •





August 16, 1941

Triples Output

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A SCIENCE SERVICE PUBLICATION

Do You Know?

British *architects* are working on a two-year scheme for rebuilding Britain after the war.

It is thought possible that the number of eyes that a *scallop* has may be an indicator of the shellfish's age.

In the first World War, the U. S. Army operated more than 200 types of military *vehicles*; today 16 are operated.

Nylon or rayon fibers are to replace silk in the special paper used for printing United States money and government bonds.

Otters and *badgers* seldom face a food shortage because they eat so many things, including roots, snakes, honey, fruit, worms, eggs, and frogs.

To start a *blood bank* in Richmond, graduates of the Medical College of Virginia have given a pint of blood apiece—value in money, $1,850.

New in house construction are *walls* that bend, made of rounded pieces of wood cemented to canvas backing and resembling a roll-top desk front.

Well-trained cavalrymen and mounts can *march* 35 miles a day and in emergency can cover 125 miles in 48 hours, but by getting "a lift" with mechanized transport, a cavalry regiment now can travel 150 miles a day and can do 300 miles in 24 hours on good road, if necessary.

QUESTIONS DISCUSSED IN THIS ISSUE

Most articles which appear in SCIENCE NEWS LETTER *are based on communications to Science Service, or on papers before meetings. Where published sources are used they are referred to in the article.*

AERONAUTICS

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PUBLIC HEALTH

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What precautions are being taken to protect public health despite chlorine shortage? p. 103.

Why are health officials trying out anti-typhus fever vaccine? p. 103.

TEXTILES

What has been produced to replace silk stockings for evening wear? p. 104.

In the World War, *airplane engines* had to be overhauled every 50 hours, today they can go 600.

Carrot lolly-pops, sold to English children to provide Vitamin A, consist of a carrot on a stick plus sugar syrup coating.

A *weather laboratory* in one instrument plant tests aircraft instruments at temperatures from 40 below zero to 150 above.

An Alabama prison farm is growing 500 acres of *sweet potatoes* to test commercial production of sweet potato feed for livestock.

Directed by Army engineers, WPA workers are making extensive *maps* of *terrain* for use in Army maneuvers.

Most of the *Indian drums* made in the Southwest for sale in curio shops are made at Cochiti Pueblo, New Mexico.

Although Burma produces aviation gasoline and other petroleum products, its most important war mineral is *tungsten ore.*

A Carlsbad Caverns National Park ranger says that *bats* habitually fly in dusk or darkness, but they can see as well in daylight as the dark.

SCIENCE NEWS LETTER

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ASTRONOMY

Sun Is Bound To Explode, Turning Earth to Cloud of Gas

But Don't Be Alarmed; Several Billions of Years Will Probably Elapse Before This Catastrophe

THE SUN is going to explode!

This conclusion seems a certainty, says Dr. George Gamow, professor of physics at George Washington University, and one of the scientists who have helped astronomers to understand the alchemical process by which one element is changed into another to keep the sun and other stars fueled.

However, this terrific explosion, which will instantly convert the earth into a cloud of hot gas, is not likely to come soon enough to bring a stop to the present war. No doubt there will be many periods of war and peace before this catastrophe brings the world to an end, for, Dr. Gamow reassures us, it is not likely to happen for several billion years at least.

About twenty times a year astronomers, through their telescopes and occasionally with the naked eye, discover a "nova" or new star. Some of these are "super-novae," many times more brilliant than the common variety. Dr. Gamow thinks that the difference between the two kinds is merely one of the mass of the original star.

"Whereas the explosion of such a giant star as Sirius," he says, in a report of his theory, (*Popular Astronomy,* August) "would lead to a very brilliant supernova comparable with the 'star of Bethlehem,' the explosion of our own sun, which is known to be a middleweight star, would be probably classed as an ordinary, common nova.

"This will make, however," he adds, "but a very little difference for the population of the earth, since in both cases the increase of solar heat will be quite sufficient to turn our planet instantaneously into a cloud of hot gas!"

With twenty novae a year, and our Milky Way system of stars about two billion years old, he states, some 40 billion stars in this system have already exploded. He estimates that there are between 40 and 80 billion stars in the system, so "the chances of explosion for any individual star are fairly high."

It has been established, "beyond any doubt," according to Dr. Gamow, that transmutation of elements, for which the ancient alchemists sought in order to transfer base metals into gold, is the source of stellar energy. In the case of the sun, hydrogen is changed to inactive helium. Dr. Gamow's work has shown, paradoxically, that as the supply of hydrogen fuel is used up, the sun gets hotter, and the remaining fuel is burned faster.

"When the solar hydrogen content drops from its present value of 35% down to only 1% the sun will become about 100 times as bright as it is now," he declares.

This will make rocks on the daytime side of the earth as hot as the kitchen stove, the oceans will boil, and human beings, if they have not been able to migrate to a more comfortable planet, will have to "spend most of their time in air-conditioned underground shelters," suggests Dr. Gamow.

"Fortunately enough," he says comfortingly, "the above described picture corresponds to a very distant future indeed, since the consumption of hydrogen and the increase of solar brightness are going on extremely slowly. It has been estimated, in fact, that the chemical reaction producing the radiation of the sun consumes about 0.000000001 (one-billionth) per cent of solar hydrogen per century, so that it will be several billion years before this amount will be essentially changed, and the sun will become hot enough to set the oceans boiling!"

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MILITARY SCIENCE

Lightness of Ammunition Factor in Choice of Gun

LIGHTNESS of ammunition for the Army's new .30-caliber carbine, enabling the soldier to carry a large number of rounds without overburdening himself, is a decided point in the new weapon's favor. Being of relatively small caliber and of pistol-cartridge length, they are only about half the weight of the .45-caliber cartridges used in present service pistols and "Tommy" guns.

RAID WARNING BY RADIO

David Sarnoff, president of the Radio Corporation of America, and Director of Civilian Defense Fiorello H. La Guardia demonstrate a new RCA alert receiver that turns on automatically when it receives a special inaudible signal from a broadcasting station. If an emergency required it, the people could thus be warned in their homes. The alert attachment, which rings a bell in response to the inaudible signal, can be put on standard broadcast receivers.

The range at which they are expected to come into action, 300 yards, reemphasizes the reduced distances at which modern hand-gun actions are fought. The day of massed rifle firing at objectives a thousand yards or more distant is over. Machine guns, mortars and infantry-accompanying howitzers take care of that part of the battle now. So although the regular service rifle is capable of long-range fire, it is seldom called upon to deliver it. A lighter weapon able to produce results at 300 yards has range enough to be really effective in at least the infighting stages of present-day combat.

The carbine may be the answer to one of the problems that has plagued artillerymen for many years. In an effort to find a weapon suitable for close-up defense of their guns against unexpected breakthroughs, artillerymen have been equipped with practically everything from bolos to regular infantry rifles. Sidearms are ineffective at any but the shortest ranges, and rifles are awkward and in the way of the gunners' regular job. The handy little carbine, which can be kept slung across the back and doesn't weigh enough to bother, looks closer to the right prescription than anything that has yet been tried.

Science News Letter, August 16, 1941

PUBLIC HEALTH

Sleeping Sickness Outbreak Spreads to Four States

North Dakota, South Dakota, Minnesota and Colorado Now Report Cases; Infantile Paralysis Now in North

THE sleeping sickness (encephalitis) outbreak is spreading. Four states have reported cases to the U. S. Public Health Service.

In North Dakota, where the outbreak started, the cases were fewer for the week ending on Aug. 2. There were 54 cases there as compared with 65 for the week ending July 26.

But Minnesota reports 35 cases in that state. In South Dakota there were 19 and in Colorado, three.

The cases in North Dakota were scattered generally throughout the whole state instead of being concentrated mostly in Cass County as they have been previously. Of the 54 North Dakota cases reported for the week ending Aug. 2, only eight occurred in Cass County.

Infantile paralysis is also spreading. In the southern states, where the outbreak has been most serious, a decline in the number of cases is reported. But increases have been reported for New England, Maryland, New York, New Jersey, Pennsylvania, Ohio and Illinois.

New England had 16 cases during the week ending Aug. 2, including four in Maine, five in Massachusetts, one in Rhode Island, and six in Connecticut. In the previous week there were only four cases—two in Massachusetts and two in Connecticut. Before that there had been none.

Maryland had 14 cases, as compared with three the previous week, and of these nine were in the city of Baltimore.

In Pennsylvania, the number climbed from eight to 15; New York from 11 to 12; and New Jersey from two to five.

Ohio reported an increase from 11 to 16; Illinois from four to 13; and Michigan from seven to eight. Indiana had a decrease from eight to five.

California, which has been having a small number of infantile paralysis cases right along, reported a decrease from nine cases in the week ending July 26 to eight for the week of Aug. 2.

The total number of infantile paralysis cases for the week ending Aug. 2 was 326 as compared with 302 for the previous week. The increases in the North more than offset the declines in southern states. In Alabama and Georgia, where cases have been most numerous, cases have dropped from 58 (in Alabama) and 79 (Georgia) to 49 and 71. Tennessee reported a decline from 24 to 13 and Kentucky from 11 to seven.

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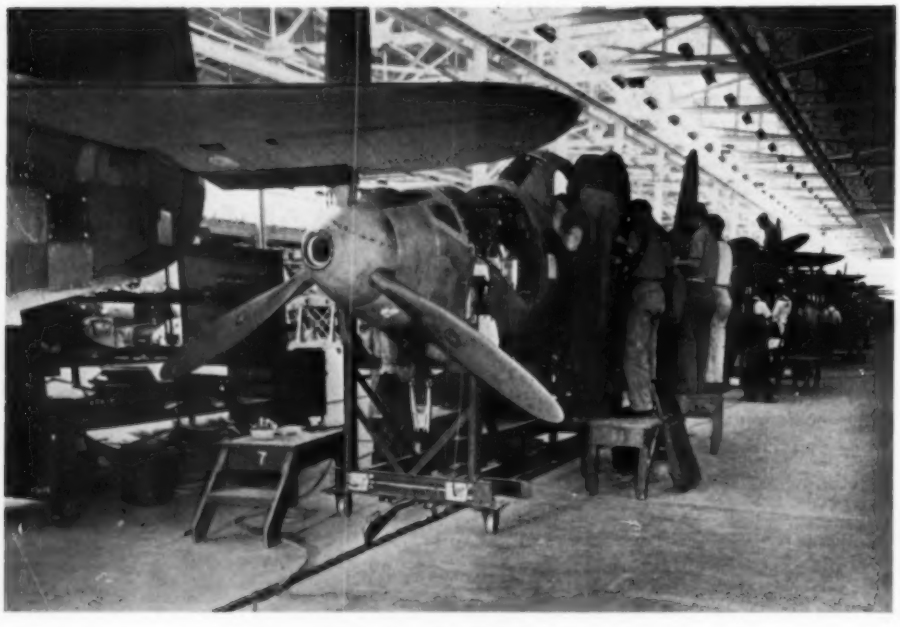

MASS PRODUCTION

These are Airacobras on the assembly line at Bell Aircraft's new plant at the Niagara Falls Airport. Fuselages in dollies move steadily up the line by means of a hook connecting the dolly with the moving chain flush with the floor. At each station there are bins holding the parts to be assembled in the plane at that point. Provision has been made for the operation of five more assembly lines in this building.

INVENTION

Wire Pipe Filter Keeps Tobacco Dry

A SPIRAL of stainless steel wire, which fits into the bottom of a pipe bowl, acts as a simple filter, so it keeps the tobacco dry and prevents particles from clogging up the tube. (*Patent Products Co., Milwaukee.*)

Science News Letter, August 16, 1941

PHYSICS

Make Liquid Air Without Pressures Formerly Used

Russian Scientist Makes Gas Work As It Expands So It Gives Up Energy and Cools More Quickly

BY MAKING compressed air work as it expands, a new method of making liquid air has been developed by Prof. P. Kapitza in the Institute of Physical Problems of the Academy of Sciences of the U.S.S.R. in Moscow, it has just been learned. A brief description of the process, based on a paper in a Russian journal, is contained in a new issue of the British scientific weekly, *Nature* (July 5).

All commonly used methods of refrigeration, whether in home refrigerators or machines for liquefying gases, make use of the same principle. This is that when a gas is compressed, it is heated; when the pressure is relaxed, it cools to about what it was at first. If it is compressed, then cooled, then decompressed, it drops to a temperature considerably below what it was originally.

Since the nitrogen making up most of the air has a boiling point (where it changes from liquid to gas) of 320 degrees below zero Fahrenheit, it must be cooled to this low temperature to liquefy it. This is done in several steps of compression, cooling and expansion, each one carrying it down some more. The Linde machine, widely used, uses pressures as high as 200 times that of the atmosphere.

It has been realized, however, that if, instead of merely allowing the gas to expand, it was made to do some work at the same time, still more energy would be removed from it, and the cooling would be still greater. Prof. Kapitza has done this, by making the expanding gas drive a turbine. With this system the necessary cooling can be obtained with an initial pressure of only 5 atmospheres, instead of 200.

In the present Kapitza machine, the turbine revolves at 40,000 revolutions per minute. About 30 kilograms (66 pounds) of liquid air can be produced in an hour, using about 1.7 kilowatt hours of electricity in power for each kilogram. By utilizing the mechanical energy from the turbine, and with improved valves, it is thought that this may be reduced to 1.2 kilowatt hours per kilogram, about the same as with present machines using high pressures. Working on a larger scale, with smaller heat losses, Prof. Kapitza expects to be able to make it still more efficient.

In any event, the writer in *Nature* points out, the Kapitza outfit has many advantages. It can be started in 20 minutes or less, is small in size, and does not need the many auxiliary attachments of the high pressure apparatus.

Science News Letter, August 16, 1941

ENTOMOLOGY

Chinese Predator Kills Red Scale of Citrus Trees

Parasite Pest Killers Collected in China and Flown In Clipper From Hong Kong To San Francisco

A FORTY-YEAR war between agricultural scientists and a parasite is about to be won by the scientists. Red scale, an insect rated as number one pest of citrus groves, has seriously threatened our chief source of vitamin C, yet no control methods have been successful against it.

The University of California Citrus Experiment Station now announces a sure death for red scale; an insect imported from South China that hunts and devours the citrus pest. J. Linsley Gressitt, University of California graduate, now at Lingnan University, went to China at the request of the Citrus Experiment Station and collected the pest killers.

The insects rode a clipper plane from Hong Kong to San Francisco, then were sent directly to the United States Department of Agriculture insectary at Hoboken, New Jersey, to be tested as "carriers" of tree disease. When no evidence of citrus canker was found in the shipment, the insects were sent to California for trial as red scale predators.

The Chinese insects successfully cleared laboratory test trees of the scale. Orchard tests of from two to four years will be necessary to check the laboratory experiments, and large numbers of the insects have been raised for release in Southern California citrus groves. If normal orchard conditions do not limit their effectiveness, one of the greatest problems of Western citrus growers will be solved.

Sprays and fumigation, costly and sometimes harmful to trees, have been of little help in the war against red scale in recent years. If the Chinese immigrant predator is as effective in orchards as in the laboratory, hundreds of thousands of dollars now spent on other controls will be saved by the living, self-propagating insect control, and bigger and better crops of citrus fruits will be harvested.

Harold Compere, Dr. Stanley Flanders, and Dr. H. S. Smith of the Station Staff have conducted the experiments.

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PALEONTOLOGY

Fifty-Million-Year-Old Animal Skeletons Found

SEVERAL skeletons of an ancient hippopotamus-like animal known as Coryphodon, together with "spare parts" consisting of extra skulls, limb bones, jaws, etc., have been found in Colorado by an expedition of the Field Museum of Natural History, under the leadership of Bryan Patterson, assistant curator of paleontology.

Since there are at present only three reasonably complete Coryphodon skeletons in all the museums of the world, this new find constitutes a real scientific treasure trove.

Coryphodon was not closely related to the hippopotamus, despite its superficial resemblance. The evolutionary line to which it belonged has become totally extinct. The animal lived in the Eocene period, near the beginning of the Age of Mammals, reckoned at between 50 and 60 million years ago.

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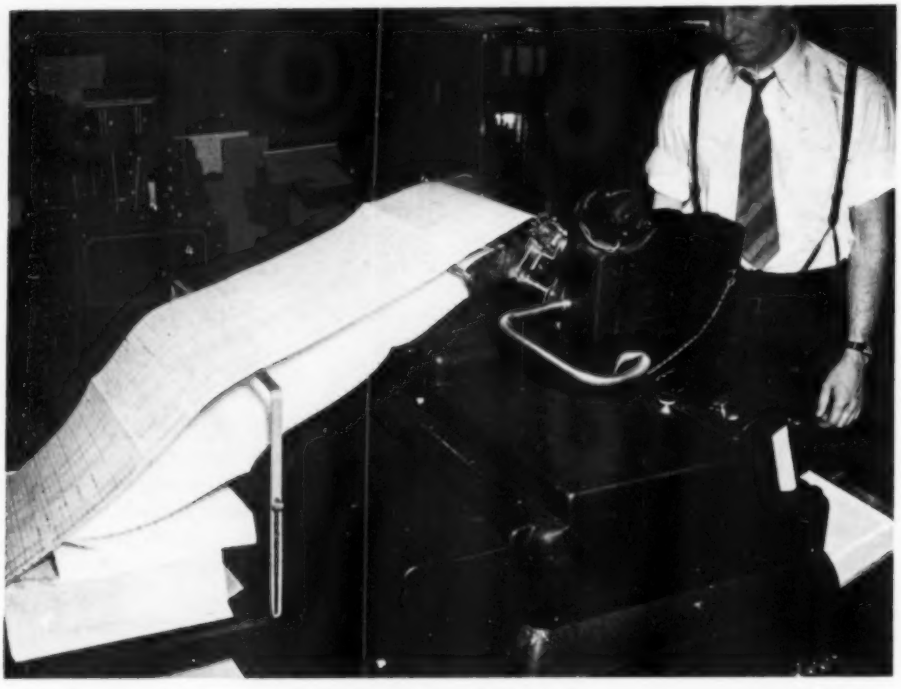

ROBOT ACCOUNTANT

This alphabetical accounting machine prints in convenient tabulated form the information about Army supplies. Using such electrical robots as this, the U. S. Quartermaster Corps is speeding the paper work needed to equip an army of 1,500,000 men, which may triple in a few years.

ENGINEERING

Robots Speed U.S. Army's Count of Its Many Supplies

Each Quartermaster Supply Depot Keeps Punch Card Record Showing State of All Its Supplies on Hand

ROBOT soldiers with mechanical brains are now counting the Army's supplies.

They count at such untiring speed that the Quartermaster Corps now knows every week exactly how many items are on hand from boats to boots and parachutists' helmets to skis. What is more, the Corps also is aware of how many of everything each Army unit expects to need, sooner or later.

The robots are credited with a great victory over red tape, by tremendously speeding up the paper work involved in supplying over a million men with clothing, shelter and transportation.

Squads of electrical machines are the mechanical troops drafted for this new service. The robot squads are on duty at the War Department in Washington and at 15 supply depots.

Number and types of machines assigned to different depots vary, according to the job. A five-machine unit consisting of card punches, mechanical multipliers, and accounting devices can do in one day what 15 men with 15 pencils would require a week to turn out.

Acting as a sort of arithmetical sergeant major, a human attendant gives the machines orders by simply plugging in electric cords and arranging cards according to the type of punching, writing, or figuring desired.

By the new system, each of the 15 Quartermaster supply depots keep a punch card record showing the state of its supplies. An exact copy speeds every week to Washington, where all cards are called in. Washington then gets out a weekly report covering 60,000 items that the Army Quartermaster Corps supplies. The machines are not being used to count food stores.

Operated by one girl, a card punching machine can produce 2,000 cards a day. A given card, for example, might show by variously spaced holes how many enlisted men's web-waisted belts are needed at a new Army cantonment.

Taking these punched cards, all of which carry information about supply requirements, a multiplying punch machine dashes off about 15,000 cards a day, and computes a month's requirements for any Army unit. Whether the unit is a section of 12 men or a field Army with 52,938 individuals, the multiplier carries on.

So "bright" are the Army's robot multipliers that they can multiply by a factor in four decimal places and get the answer in whole numbers, dropping all fractions of less than one-half and picking up all fractions of one-half or over, which gives the next number.

An alphabetical interpreter then takes the information from the punched holes and converts it into printed lines of words across the top of the cards. The machine interprets about 15,000 cards a day.

Thus far, the Army's robot accountants have worked only on quantities of items. Later they may take over a job now done by human brains—figuring the weight and cubic space that items occupy, which is information vital in the planning of transporting supplies.

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MEDICINE

Research Worker Contracts Infantile Paralysis

FOR the first time in 30 years, a laboratory worker has contracted infantile paralysis (poliomyelitis) under circumstances that make it highly probable that it was accidentally picked up during research work with the virus.

In order that other investigators may take unusual future precautions, this case of B. J., a woman of 35, is published (*Science,* Aug. 1) by her colleagues, Dr. Albert B. Sabin and Dr. Robert Ward of the Children's Hospital and the University of Cincinnati College of Medicine.

The duties of the victim included working with monkeys experimentally infected with human poliomyelitis virus strains. She went on vacation the middle of June and ten days later became ill with the disease.

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PUBLIC HEALTH

Health Service Officers Go To Bolivia to Test Vaccine

Dangerous European Type of Typhus Fever Always Present in Highlands There, Facilitating Trial

TWO top-flight disease fighters of the U. S. Public Health Service, Dr. R. E. Dyer, assistant director of the National Institute of Health, and his colleague, Dr. N. H. Topping, have gone to La Paz, Bolivia, to make an extensive, thorough trial of the anti-typhus fever vaccine on which the safety of British and American troops and even the outcome of the present war may depend.

The possibility that American troops may have to go into typhus fever regions of South America for hemisphere defense, as well as plans for aid to Britain which include supplying her with the typhus fever vaccine, make it vitally imperative to know whether or not this vaccine works.

Previous attempts to test the vaccine in European countries where typhus fever is a constant threat to life have failed because of the war abroad. Large batches of the vaccine, made according to the method originated by Dr. Herald R. Cox, of the U. S. National Institute of Health, were sent to Hungary, Rumania and Spain. Reports as to the results of the trials have either been inconclusive or have failed altogether to reach officials in the United States. So the U. S. Public Health Service is going to make the tests itself under conditions that will leave no doubt about the results.

Enough vaccine for 5,000 persons has already been sent to Bolivia, where public health authorities and officials have promised full cooperation for the tests. The director of the state health department laboratory will probably work with Dr. Dyer and Dr. Topping.

These tests present one of the most difficult problems in disease-fighting. For each person vaccinated, there must be one person unvaccinated who lives under exactly the same conditions as the vaccinated person, living in the same house, even sleeping in the same bed if possible, and thus equally exposed to the typhus fever germs which are spread by body lice.

The dangerous European type of louse-carried typhus fever, which kills from one-fifth to about three-fourths of those who get it, is always present in the highlands of Bolivia and certain other South American countries, often flaring to disastrous epidemics. If an epidemic should break out in regions where Dr. Dyer and Dr. Topping have vaccinated one-half the population, they will have a quick answer on what the vaccine is worth, from comparing the number of cases, if any, among the vaccinated with the number among the unvaccinated. There is always so much typhus in Bolivia, however, that they will get an answer even without an epidemic. It will take longer, maybe as long as nine months, Dr. Dyer said, but Bolivia offers the best opportunity in the world today for field trials of the vaccine. It cannot be tried in the United States because we do not have any European type typhus fever here.

The Cox vaccine is the best of all those that have been prepared to fight typhus fever, the Public Health Service believes, because it has given the best results in animal protection tests and because it can be manufactured on a large scale. While Dr. Dyer thinks he will need to vaccinate only 5,000 people in Bolivia to determine its value, he can get vaccine for 100,000 if he needs it.

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PUBLIC HEALTH

Shortage of Chlorine Should Not Affect Public Health

THE safety of your drinking water, your swiming pool, and the cleanliness of the drink you obtain at a roadside hot dog stand are being protected despite the shortage of chlorine.

Correspondence between Dr. Thomas Parran, Surgeon General, and the Director of Priorities, E. R. Stettinius, Jr., reveals that there is plenty of chlorine to take care of the needs of public health.

The only danger to the supply for water works and sanitation seems to lie in an unfounded fear that a shortage will develop. Acting on this fear, some buyers are overstocking, thus tying up containers. Lack of these containers may slow up the filling of new orders.

Public Health uses of chlorine have been put on a par with defense needs by the Office of Price Administration and Civilian Supply. Adequate supplies are insured for water purification, sewage treatment, sanitation, refrigerant gases for existing equipment, slime control in industrial plants, preparation of products for medicinal use, preservation and processing of food products.

Not specifically mentioned in this provision is the use of chlorine by many soda fountains, roadside stands, and bars for the sterilizing of dishes and glasses where steam or boiling water is not readily accessible. Chlorine is also widely used on dairy farms and city milk plants to kill bacteria in containers and to sterilize the hands of milkers and the udders of the cows before milking.

For these purposes, a dry form of chlorine—sodium hypochlorite or calcium hypochlorite—is used, not the liquid chlorine commonly used as a bleach as well as a disinfectant.

The OPACS is depending on distributors of this dry chlorine to see to it that these important public health needs are adequately filled.

Public Health officials know of no substitute which will kill the germs and not endanger humans.

They warn that without careful sterilization of milk containers, drinking glasses and dishes, there would certainly be a spread of many diseases carried in this way, including colds and influenza, tuberculosis, typhoid fever and paratyphoid fever, septic sore throat, diphtheria and scarlet fever.

Of the present production of chlorine, it is estimated that about 30% will go for defense. Only about 5% to 7% is needed for sanitation. It has been put up to the housewife, the laundry and the paper manufacturer, who use chlorine as a bleach, to cut down their use of chlorine so that neither public health nor defense uses need be curtailed.

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TEXTILES

Sheer Cotton Stockings For Evening Wear

WEB-LIKE mesh cotton stockings fine enough for evening wear are the Government's suggestion answering feminine America's query, "What will we wear when sheer silk hose are gone?"

More than 150 designs for all types of cotton hose, from sturdy sports weights to sheer mesh and lace that can be worn with toeless evening shoes, are ready and waiting for American hosiery manufacturers to copy in mass production.

Three years ago, Congress anticipated silk trouble because of international complications, and set the Department of Agriculture to work streamlining cotton hose. The new designs, evolved under direction of David H. Young, textile technologist, are pronounced far less likely to snag or wrinkle than leg coverings of the last cotton stocking era.

Some of the Government's designs are already available in shops, with more in prospect. It is estimated that 89% of the full-fashioned knitting machines in this country can knit cotton as well as silk, while 47% can handle nylon.

Science News Letter, August 16, 1941

ENGINEERING

"Dimouts" Urged Instead of Total Blackouts for U. S.

IF WAR and air raids come to the United States we may be saved from the dangers of total blackouts by "dimouts" instead.

This is the suggestion made by Samuel G. Hibben, Director of Applied Lighting for the Westinghouse Electric and Manufacturing Co. He is now working with the National Technological Civil Protection Committee to draft a standard set of air raid precautions for use in American cities in event of war.

His idea is that power stations should be equipped with voltage regulating devices. Then, in case of an enemy raid, the street lighting circuits could instantly be reduced so that the lights would pale to the reddish glow of the harvest moon. This would give enough light for civilian activities but, it is believed, they would not be visible from the air.

"Total darkness during air raid attacks often can cause more civilian casualties than falling bombs, and in some instances even make a city more vulnerable to attack," explained Mr. Hibben. Lights in surrounding suburban and country areas outlining a blacked-out city make it a conspicuous target, he said.

Since traffic must move, even during bombardment, he proposes that city police be provided with portable, shielded traffic lights which they would carry strapped to their shoulders. He recommends a band of white on the bodies of cars and trucks, with cat-eye slits in headlights and small running lights suspended under the chassis.

Ultraviolet "black" light can be used when intensities still lower than moonlight are required, he said. Signs would be painted with materials that glow under the invisible rays, and used to indicate subway entrances, police stations, bomb shelters and hospitals.

Science News Letter, August 16, 1941

MEDICINE

Cancer Patients in Death Confirm Animal Studies

PATIENTS dying of cancer and leukemia, cancer-like disease of the blood, gave in their last days of life and after their death final confirmation of studies which University of California researchers hope will lead to better treatment of cancer and leukemia patients in future.

Phosphorus made radioactive by the giant atom-smashing cyclotron when injected into the mice with leukemia, previous experiments had shown, concentrates in the affected tissues of the body and since the rays of the phosphorus destroy leukemia cells, this radioactive phosphorus has been used as a treatment for the disease.

Radioactive phosphorus is likewise rapidly taken up by cancer tissue when injected into the bodies of mice with cancers. It is taken up by cancer tissues as fast or faster than by normal tissues such as liver and spleen in which there is a rapid turnover of phosphorus.

The radioactive phosphorus, which emits radium-like rays which can be detected with sensitive instruments, was given to six human patients dying of cancer and to four dying of leukemia.

In post-mortem examinations it was found that the experimental results with animals were borne out.

Researchers said that this was a final confirmation of the experiments with animals.

The research was done by a group of workers in the Radiation Laboratory of the University, headed by Dr. John H. Lawrence, assistant professor of medicine. He was aided by Dr. L. A. Erf, research fellow, and Gerhart Friedlander, graduate student.

Science News Letter, August 16, 1941

IN SCIENCE

ENGINEERING

Horseshoe-Shaped Yoke Triples Work of Machine

See Front Cover

BY MEANS of a horseshoe-shaped metal yoke, attached to a boring mill in the General Electric plant in Schenectady, the one machine is made to do work formerly requiring three. The device is used in making bearing rings and self-aligning bearings for battleships, and the time required for this small but vital step is cut in half.

The yoke attachment was devised by Waclaw Dasziewski, 53-year old Polish-born mechanic. Without the yoke the required smoothness could not be attained on either the vertical mills used for the bearings or the horizontal mills for the rings, and they had to be finished on a lathe. With Mr. Dasziewski's invention, shown on the front cover of this week's SCIENCE NEWS LETTER, one mill does it all.

Science News Letter, August 16, 1941

AERONAUTICS

Aeronautical Laboratory Gift Of Swedish Industrialist

STUDIES of airplane engines which will not only improve fighting planes but will be an aid to civil aviation as well are now under way in a new research laboratory of the University of Kentucky. Named after Axel L. Wenner-Gren, Swedish industrialist and philanthropist who donated $150,000 for its construction, it was turned over to the University by Colonel James H. Graham, dean of the College of Engineering, and Chief Civil Engineer of the U. S. War Department.

Research, under the direction of Prof. A. J. Meyer, director of the laboratory, will concentrate on problems of combustion, cooling, lubrication and airplane engine mechanism.

In a statement quoted by Colonel Graham, Mr. Wenner-Gren, who is now living at Nassau, said that "the United States possesses the skill and the resources to solve many pressing aviation needs. Equally important, it has the will to devote the results to constructive democratic purposes throughout the globe."

Science News Letter, August 16, 1941

NCE FIELDS

BIOLOGY

Pure Sea Water Found Poisonous to Bacteria

PURE sea water is poisonous to bacteria, states Prof. Claude E. ZoBell of the Scripps Institution for Oceanography, La Jolla, Calif. Sea water also contains an organic substance that can be precipitated by aluminum and iron salts, and destroyed by heat. If during laboratory analysis of ocean water polluted by sewage, it should be diluted to only 5% of the sample, this concentration will actually stimulate the growth of organisms. Prof. ZoBell points out that these factors can easily distort the picture of the problem of sewage contamination of the ocean.

Away from the shore, only ten parts of organic material are found in a million parts of water. This is too low a concentration to provide enough nourishment to support much bacterial life. There has been a conflict of opinion on the question whether normally one should expect to find the same bacteria in the digestive tracts of marine animals as are found in humans. The work of Prof. ZoBell and his associates at the Scripps Institution seems to indicate that there is no similarity except when the fish are feeding in contaminated waters.

Science News Letter, August 16, 1941

CHEMISTRY

Ozone More Poisonous With Nitrogen Oxides Added

OZONE, the stuff that creates the faintly sharp odor when you turn on your sunlamp, becomes poisonous to human beings only when its concentration rises above 20 parts per million of air, Clark E. Thorp, Chicago industrial chemist, has reported to the American Chemical Society. Its toxicity, however, is considerably enhanced when it is mixed with oxides of nitrogen.

Ozone is a form of oxygen gas, with three atoms to the molecule instead of the usual two. It is formed in pure state by the action of ultraviolet rays on oxygen. Electric discharges through the air produce a mixture of ozone and oxides of nitrogen in roughly half-and-half proportions.

Five hundredths of one part of ozone per million of air can be detected by a keen sense of smell. One tenth part per million is easily detectable, but not unpleasant. At one part per million the odor begins to be unpleasant to some persons. At 100 parts per million, a one-minute exposure produced dry skin and severe sore throat. The same concentration killed mice left in it for an hour.

Ozone is used as a germicide in various industrial applications. Pure ozone in low concentrations had weak killing effects on bacteria and other one-celled plant forms. In higher concentrations, especially when mixed with oxides of nitrogen, it was much more effective. Thirty parts per million of the mixture killed all colon bacilli in water at less than 1,000 of the bacteria per cubic centimeter of water.

Science News Letter, August 16, 1941

PHYSIOLOGY

Phosphorescence of Teeth Test for Good Health?

A GHOSTLY light shining from your teeth after an ultraviolet lamp has been flashed on them may, at some future day, tell your doctor in one quick glance that you are suffering from malnutrition, some serious illness or have been poisoned.

The possibility of such a simple diagnostic test is suggested by Jack De Ment, of Portland, Ore., in reporting his discovery that human teeth are phosphorescent. (*Science*, July 25.)

The intense white fluorescence of human teeth which shifts to a reddish fluorescence in old age and in diseased persons has been reported previously by other scientists. So far as is known, phosphorescence, which certain lower forms of life such as jelly fish have, has never been noted before in living human teeth, Mr. De Ment says.

He discovered it in a healthy 20-year-old man by shining ultraviolet light from a cold mercury-quartz lamp on his upper and lower teeth. The teeth glowed with a medium green light for several seconds thereafter.

"It would be interesting to study the phosphorescence of teeth in relation to disease, deficiency of diet, poisoning and other conditions, since the action might provide a simple diagnostic measure for certain pathological states," Mr. De Ment states.

Science News Letter, August 16, 1941

BOTANY

Earthly Flowery Eden In Chinese Mountains

AN EARTHLY Eden, a real Shangri La, carpeted with a rainbow of flowers from June until August, has been discovered in an inaccessible mountain fastness in Kansu province, northwestern China, by R. C. Ching, a Chinese botanist collecting for the Smithsonian Institution. A bulletin describing the plants he found there, written by Egbert H. Walker of the U. S. National Museum, has just been published by the Institution.

The country, which is a high plateau, treeless and almost uninhabited, is exceedingly difficult of access, Mr. Ching reports. He struggled across deserts and over mountain ranges by impossible roads and obscure paths. When he arrived on the plateau, he traveled for two days without seeing a living soul, although he did find mud huts which had been used by Tibetan herdsmen.

The flowers, like mountain flowers elsewhere in the world, burst into bloom very suddenly, after summer is well advanced in the lowlands. Thereafter for a couple of months the place is a paradise, with masses of lemon yellow, purplish blue and deep red, as far as the eye can see.

Metropolis of the plateau is a settlement known as Labrang, at an elevation of 8,900 feet. It consists of the shops of about 100 Chinese and Mohammedan merchants, with a huge lamasery housing more than 3,000 Tibetan monks. Past the town runs a river, the Labrang Ho, spanned by five-arch bridges. The clearness of its water, Mr. Ching says, suggests the existence of immense forests at its source, far up in the Tibetan country.

Science News Letter, August 16, 1941

ENGINEERING

Water Heater Operated When Current Use Is Low

A TIME SWITCH for controlling electric water heaters to operate during hours when normal consumption of current is low, is mounted on a base, and provided with a glass cover like the common watt-hour meter. The timing is adjusted easily when the cover is removed. It will handle 240 volts at 40 amperes. (*T-52 Time-Switch, General Electric.*)

Science News Letter, August 16, 1941

PHYSICS

40,000 Volts on Autos

High Charges of Static Electricity Are Generated By Rubber Tires on Non-Conducting Road Surfaces

By JAMES STOKLEY

AS AMERICA'S defense program swings into high gear, more and more motor traffic flows along the roads from coast to coast.

Supplies to defense factories, army convoys, workers going to and from their job, tank trucks carrying oil to relieve the shortage along the eastern seaboard — these and many others are rolling along, continually subject to a very real and very insidious form of sabotage.

This is fire, set off by static electricity.

Any vehicle, which runs on rubber tires, accumulates charges of static electricity that may sometimes amount to as much as 40,000 volts!

Perhaps you have had the experience of feeling an electric shock when getting out of your car. Or you may have felt it when handing a coin to a toll collector, or when boarding a bus. And even more familiar is the spark you can draw from your finger tips in the winter time when you touch some grounded metal object.

Such experiences are not only annoying, they may actually be dangerous. Not long ago, for example, several deaths were reported of patients in a hospital where explosive vapors used in anesthesia had been set off by sparks from the surgeons as they scuffed around on rubber mats in the operating room. Charges generated on belting used in power drives in factories may have caused sparks which set off mysterious fires. And in discharging gasoline trucks, great pains must be taken to avoid any spark which might ignite the inflammable vapor.

Little Accurate Information

Despite the risk involved, it is surprising that, until a couple of years ago, there was little accurate information on the subject of static charges on automobiles. Since then, however, Prof. Robin Beach, head of the department of electrical engineering at the Polytechnic Institute of Brooklyn, has been conducting an extensive research on the cause and cure of automobile static.

Recently, in a report issued by the Society of Automotive Engineers, Prof. Beach explained how a car becomes electrified.

"The generation of electric charges at the areas of contact between the tires and the roadway has been attributed to the process commonly known as 'frictional electricity,' " says Prof. Beach. "This is both a misnomer and a misconception of principle. The basic principle underlying this phenomenon is actually that of 'contact difference of potential.'

"If one substance is pressed firmly into contact with another, electrons, which are the smallest known individual particles of electricity, are appropriated by one substance from the other. This action causes that substance into which these so-called 'free' electrons migrate to acquire negative electrification; and, because of the loss of electrons from the molecules of the other substance, it acquires an equal positive electrification.

Billionth of Inch Apart

"The so-called 'contacting' surfaces of the tires and the roadway are actually no closer than their molecular boundaries permit, and, therefore, they are separated, one from the other, by at least one billionth of an inch. As the two substances acquire their respective negative and positive electrification, they constitute a charged electrical condenser."

This difference of potential, he has found, is a fraction of a volt. But, "as the wheels roll along the roadway, each unit of area of the tire tread is, in turn, separating from the road surface.

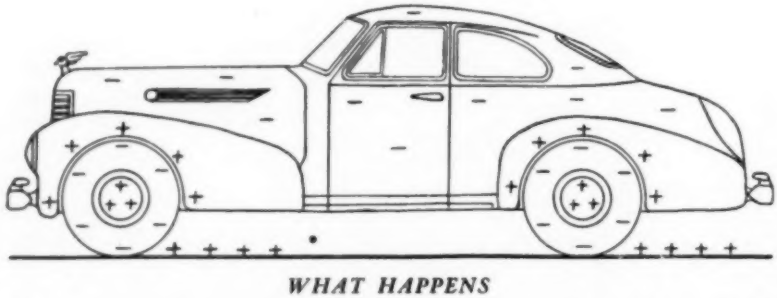
"This causes its condenser effect, or capacitance, to decrease to a very small value, and since the amount of charge on a unit area of the tire is a fixed value during a revolution of the wheel, the voltage between the roadway and the separating area of the tire greatly increases. A potential difference of thousands of volts may thereby be attained."

When the treads of the tire thus acquire a high charge of negative electricity, the free electrons in the fenders, wheel rims, and other neighboring parts of the car are repelled. In that way these parts, near the tire, get what is called a "bound" positive electrification, since they have less than their normal quota of electrons. The electrons, in their turn, migrate to parts of the car body as far as possible from the tires, and these parts have a negative charge. Then, if a wire is connected between these parts of the car body and some grounded object, say a hydrant, the electrons will flow away. The voltage between the car and the ground may be as high as 40,000 in the case of heavy trucks and buses, enough to make a spark that will jump a half-inch gap. It is small wonder that you feel a shock when you act as the connecting wire to a grounded person or object.

Drops Quickly

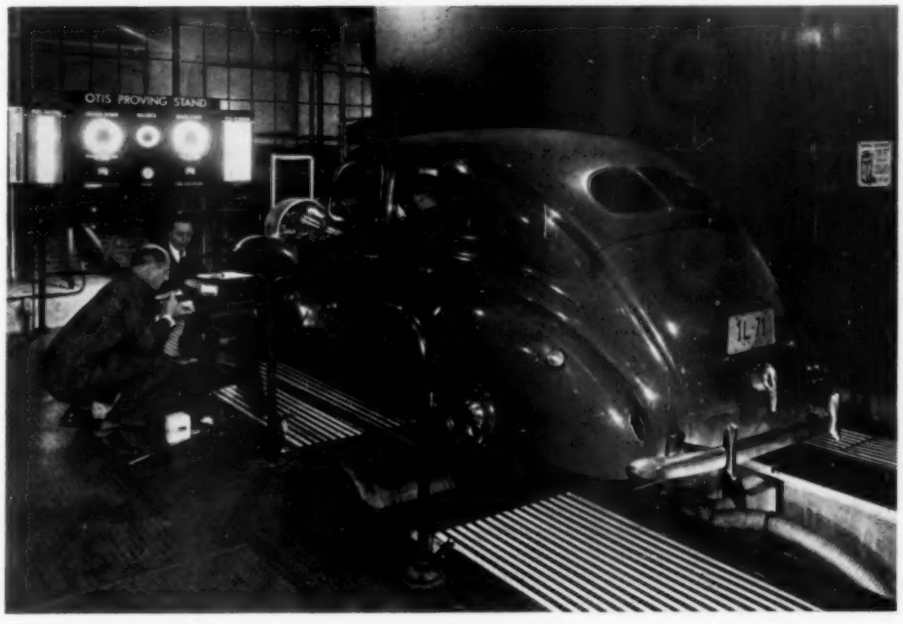
Prof. Beach has figured that, with a bus charged to 15,000 volts, the current flowing into a person's finger at the instant of contact is five amperes, though it would drop to zero in a thousandth of a second.

"The physiological effects of electric current through the body for such short durations are not known," he declares, "but currents of these magnitudes may



WHAT HAPPENS

Electric charges on an automobile as it drives along a modern highway are indicated in this diagram. The tires themselves receive a negative charge, and leave a trail of positive charges on the road after them. Parts of the car near the tires are positively charged as negative charges are repelled to more remote regions.



MEASURING CHARGE

Prof. Robin Beach (left) makes measurements of the static charge on an automobile as it is driven at speeds equivalent to as much as 70 miles per hour on the proving stand.

prove serious. Strong, hefty mechanics have been known to be thrown to the ground by shocks received from touching the bodies of electrified automotive vehicles."

In order to test these conclusions, Prof. Beach turned his own automobile into a mobile laboratory. He connected wires around it, and installed a meter that measured up to 30,000 volts. He took his instruments to the toll booths of the Holland Tunnel and the Marine Parkway Bridge in the New York area, measuring the voltage between vehicle bodies and the ground as they stopped. Then he made tests on a "proving stand." This permits a car to be operated up to "speeds" of 70 miles per hour, while standing still, running on rollers.

Speed Increases Charge

The faster the automobile is going, and the greater the "pull'" that it has to exert, the more charge it accumulates. This, of course, follows from the basic principle "that the more intimately the contacting substances are pressed together the greater the generation of static electricity."

One might suppose that when a tire is soft, there would be more contact with the road, and more electrification, but this is not the case. At low speeds there is little difference, but Prof. Beach's tests showed that, at 40 miles per hour, a charge of nearly 10,000 volts was obtained with 40 pounds pressure in the tires. Using similar conditions, but with 80 pounds tire pressure, it was more than 13,000 volts with the same speed. The reason is that, with more inflation, there is greater loading on the tire, and it is pressed into more intimate contact with the road, though over a smaller area.

Chain Doesn't Help

Dragging a chain after the vehicle, a common practice with oil trucks, made no measurable difference in aiding the decrease of voltage on the car, he found. "Since the pavement was not grounded but comprised a most excellent insulator, the drag chains, obviously, could not be expected to discharge the car," he points out. Measurements of the insulating properties of dry road surfaces were made with an instrument called a "megger" and showed the resistance to be extremely high, even between two metal strips a quarter of an inch apart. In some cases, the readings went beyond the scale of the indicator. When the road is wet, its conductivity is increased.

Even grounding the car, by connnecting it to a wire or grid, the practice used in various filling stations, is not entirely effective. While the free charge on the body can be removed in this way, the charge on the tires, and on the metal parts of the car near them, remains.

"If a wrench or screwdriver, for example, was inadvertently brushed against one of these parts, a spark might result of sufficient intensity to ignite lurking inflammable vapors," says Prof. Beach.

It has been suggested that the tires should be made conductive, by painting their walls, or even making them of a special kind of rubber which conducts electricity, but this is also ineffective. Even with metal tires, highly conductive, the situation would be fundamentally unchanged, he finds, for although the charges would then be distributed somewhat differently, there would still be the same voltage between the car and ground.

Probably the most effective remedy would be to make the surface of the roadways of some material which would carry away electricity. Then, with conducting tires, the charge would be dissipated. But it might be very difficult to change the character of the nation's roads so radically and there may be other solutions of the problem. Prof. Beach suggests that perhaps some method may be found of reducing the generation of the charge at the tire treads.

"This," he says, "would strike at the very heart of the problem."

Science News Letter, August 16, 1941

AERONAUTICS

"Lop-Sided" Airplane Convinced British Editor

A "LOPSIDED" airplane, with two engines, one in the nose, the other in one wing, and not balanced by a similar engine in the other wing, may not be as foolish as it seems at first glance, suggests C. M. Poulsen, editor of the British aviation weekly, *Flight* (July 3).

Writing in an editorial, he says that a letter from a reader of his magazine, who is serving in the R. A. F., suggesting such an arrangement, quickly landed in his waste basket. But then he retrieved it, and when he added to the rough sketch certain parts that had been omitted by its author, it "began to look less crazy."

"The advantages of the arrangement are obvious," he declares. "Instead of two engine nacelles and one fuselage, one has but one engine nacelle and one fuselage. Thus not only weight, but quite appreciable drag should be saved.

"Against the scheme," he admits, "is the fact that the machine might have to fly slightly 'crabber,' due to the fact that the drag of one engine installation would be greater than that of the other."

He asks for the views of designers and pilots on the matter.

Science News Letter, August 16, 1941

PSYCHOLOGY

Intelligent Understanding Best for Fighting Spirit

Democracies Have Advantage of Dictatorships Because We Can Permit The Highest Development of Character

DEMOCRATIC nations can beat the Nazis at developing a victorious fighting spirit, because only in the freedom of democracies can soldiers, sailors and airmen understand what they are doing and feel themselves an intelligent part of the national effort.

In addition to this greatest hope of superiority, the democracies can and do use all the tricks of the dictators in building up military morale, Dr. R. A. Brotemarkle, professor of psychology and personnel officer of the University of Pennsylvania, has reported to the American Academy of Political and Social Science through its current *Annals*. (*Reviewed, SNL, this week.*)

Here is how the U. S. A. and other democracies can surpass the dictatorships in using all the resources of the "whole man" in all-out defense:

Democracies can afford frank discussion of uncensored facts with any soldier, giving him an understanding that permits him to follow his orders intelligently. Blind obedience can never produce the effective action that is obtained by understanding, willing cooperation in a united effort.

Democracies can help each individual soldier to adapt himself to the ever-changing conditions of modern warfare by making available to him frank counseling on personal problems by special officers.

Democracies can build up the individual's self-respect by making him feel that he is an important part of his nation's defense as an intelligently cooperating and willingly participating free citizen.

In addition, Dr. Brotemarkle emphasizes, we can also use all the devices of the dictators:

Democracies, as well as dictatorships, can give men a feeling of security and safety by providing them with efficient equipment—adequate clothing, housing, arms and good food.

Democracies, as well as dictatorships, can instil into soldiers the fine traditions of manliness and courage in a well-respected fighting organization.

Democracies, as well as dictatorships, can make soldiers feel that they "belong" among their fellows in the Army and permit them to take part in exclusive ceremonies and rituals.

Democracies, as well as dictatorships, can teach their soldiers team work through games and sports and can get them used to their duties through extensive drills and war games.

Democracies, as well as dictatorships, can use words to build morale — by teaching legends of military life and military heroes, by emotional appeals and exhortations, by propaganda and by military regulations.

Hitler dares not go beyond these tricks.

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PSYCHOLOGY

Develops Instrument for Measuring National Morale

GUESSING about national morale, vital defense against the thrusts of modern psychological warfare, is no longer necessary. An instrument has been invented for measuring it.

This thermometer for measuring the rising and falling spirits of the people of America consists of a group of questions which might be asked of a carefully selected sample of the whole population just as successful pre-election polls are conducted. Here are some of the questions as reported by Dr. Delbert C. Miller, of the State College of Washington. (*American Sociological Review*, August.)

1. No matter what happens in this war, democracy will collapse sooner or later.

2. Every able-bodied single man who calls himself an American should volunteer now for military service.

3. The military strength of the United States could be assembled in time to give Britain enough aid to defeat Hitler.

4. There are too many old men trying to run the Army and Navy.

5. No matter how much damage Germany does, sooner or later Britain will defeat Hitler.

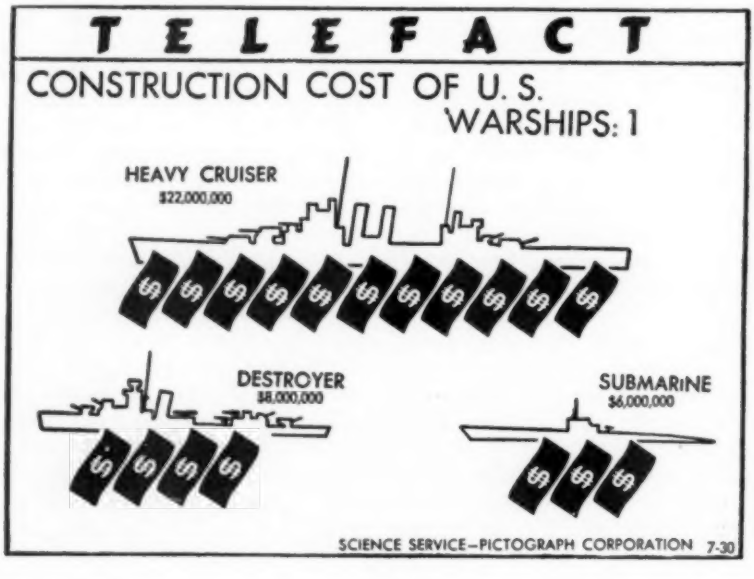
6. Whites treat the Negro in the United States worse than Germany treats the conquered peoples of Europe.

If your own morale is high, you should have answered yes to statements 2, 3, and 5. You should have said no to 1, 4, and 6.

The morale measure has already been tried out in a longer preliminary form on 200 students at the State College of Washington.

These young people, it was revealed, are optimistic. They have a belief in democracy both as an ideal and as a practical working form of government.

However, peace propaganda of the



twenties, the way history has been taught, and the scars of the depression are blamed by Dr. Miller for lowering morale of some by emphasis on the horrors of war, by suspicion of England's intentions, and by lack of confidence in the social structure.

Dr. Miller's morale measure is built on the theory that morale has five roots. For good morale, you must:

1. Believe in the superiority of our nation and those associated with us. There is some confusion at present, Dr. Miller indicates, because Americans are not agreed as to what nations to include in this group. For some, it may be just the United States—for others, England, China, South America and the defeated countries.

2. Regard national goals and your own personal goals as identical. The highest morale is founded on a sincere belief that national efforts are of the utmost importance, not just on the belief that you can make money or escape home responsibilities through aiding defense.

3. Have faith in the competence of the nation's leaders—military, political, industrial and scientific.

4. Believe that our resources are sufficient to hurl back any threat to us.

5. Have confidence that America's national goals and ideals will survive permanently.

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PSYCHIATRY

Psychoanalysts To Diagnose World's Destructive Urge

Specialists in Sociology, Ethnology and Political Science Also Join in Discussing Cause of Violence

WHY MAN in the twentieth century has directed his great talents toward the most widespread destruction of his fellowman that the world has ever witnessed is due for detailed diagnosis this fall.

Specialists in sociology, ethnology and political science are joining with psychiatrists and psychoanalysts to discuss in seminars and lectures why we behave as we do, and why at this stage in civilization we resort to such organized cruelty and violence as the present war, the American Institute for Psychoanalysis, New York City, has announced.

Ever since Sigmund Freud demonstrated over half a century ago that there are unconscious as well as conscious motives for human behavior, progress has been made in understanding why some persons fail to get along well with themselves, their families and their co-workers, and others become so unsocial that they are classed as insane. Freud, however, believed that man is inherently destructive and that nothing can be done about it. Despite his great contributions, he viewed human nature with a hopeless and pessimistic outlook, and believed that destructiveness would never be eliminated from human life.

The Association for the Advancement of Psychoanalysis, under whose auspices the American Institute for Psychoanalysis is conducted, holds a more hopeful view. This was explained by Dr. William V. Silverberg, of New York City, who is president of the Association for the Advancement of Psychoanalysis, chief of the Mental Hygiene Clinic, Lebanon Hospital, New York City, and member of the Council on Professional Training, American Psychoanalytic Association.

"We know now that a human being's character—and therefore his behavior—is molded by the society in which he lives, as well as by his instincts and his early family life," Dr. Silverberg said. "Man is a social animal. His slow advance in intelligence and skills through his long history has been accomplished through cooperation with his fellow man, and indicates his urge to turn the mind to constructive efforts. He has shown such incredible ingenuity in mastering nature that he surely should be able to prevent destructive impulses from wrecking his society."

The unsocial, destructive or hateful behavior that usually is called neurotic is the only way a given individual has found to cope with the circumstances which have befallen him, particularly in early life, Dr. Silverberg pointed out. But he can deal with the problems created by his early environment if he understands how it affected him and how the neurotic tendencies it bred handicap him. He can improve the social structure if he understands what social conditions are necessary for the development of mentally healthy individuals. And he can prevent destructive impulses from wrecking his own and others' lives if he knows what causes them and how they are exhibited in everyday incidents as well as in such organized ways as war.

"The menace to all humanity of the warped and distorted personalities of a few are evident in the present war," Dr. Silverberg continued. "But it is not the individual's aberrations alone which are responsible. If the society in which people live and work together were not so full of contradictions and conditions which make people resentful and suspicious of each other, a few individuals would not find such fertile soil for organizing destructive impulses."

By supplementing psychoanalytic knowledge of human behavior with that of the social sciences, the courses of the American Institute for Psychoanalysis hope to make clearer to scientists and interested laymen how emotional difficulties handicap a person's constructive efforts, lead to predominantly destructive attitudes and are reflected in the home, school, office, factory, nation and world.

Among the social scientists who are collaborating in this program—the first comprehensive one of its kind are Dr. Erich Fromm, sociologist, author and lecturer at Columbia University; Dr. Ralph Linton, head of the Department of Anthropology, Columbia University; Dr. Margaret Mead, author and assistant curator in anthropology, American Museum of Natural History, who applied psychoanalytic knowledge to her study of the South Sea islanders; Dr. Harold

BOOKS

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D. Lasswell and Dr. Leo Rosten, political scientists, authors and students of public opinion.

The psychoanalysts who will lead discussions and seminars are Dr. Karen Horney, dean of the American Institute of Psychoanalysis, who made notable contributions to psychoanalysis in her books, "The Neurotic Personality of Our Time" and "New Ways in Psychoanalysis"; Dr. Clara Thompson, formerly lecturer at the Institute of Euthenics, Vassar College, and authority on the history of psychoanalytic theories; Dr. Bernard S. Robbins, assistant in psychiatry, College of Physicians and Surgeons; and Dr. Harmon S. Ephron, who has made a special study of unsocial behavior in work at penal institutions.

The lectures and seminars which are open to laymen will be given in collaboration with the New School for Social Research. Other courses, in collaboration with the New York Medical College, will be restricted to physicians and psychiatrists, who wish to become psychoanalysts or to increase their understanding of the relation between psychic and organic disturbances.

Science News Letter, August 16, 1941

INVENTION

Smoother Railroad Rides Seen Possible With New Invention

Fixed Die for Holding Rail Ends in Place During Welding Process Will Reduce Unevenness of Track

SMOOTHER rides on railroads may be possible with the aid of one of the 816 inventions recently granted U. S. Patents. It is a machine for welding rails, invented by George L. Jones, Garden City, N. Y. and Charles B. Roede, Ridgefield, N. J. Their patent, number 2,250,870, was assigned to Sperry Products, Inc., of Hoboken, N. J.

In present methods of welding them, the separate rails are fed end to end into the welding machine, on a special car. However, the inventors of the new device point out, there is considerable variation in the cross section of standard rails, and this results in unevenness of the track. The Jones-Roede apparatus has a fixed die for holding the rail ends firmly in place during the welding operation. This also, they state, prevents the rails from getting out of alignment during the heating process, which sometimes happens even if the thickness is the same.

Science News Letter, August 16, 1941

Liquid in Eye Fits Lenses

CONTACT lenses, the invisible glasses worn directly over the eyeball and under the eyelid, can be fitted more precisely and easily with the subject of patent 2,250,521. This was invented by Paul A. K. Boeder, Southbridge, Mass., who assigned his rights to the American Optical Company.

To prevent discomfort, and even pain, to the user, contact lenses must be fitted very accurately. To obtain the measurements from which such a lens is fitted Mr. Boeder provides a standard lens, which is placed over the eyeball, so that a little space is left between the lens and the eyeball. This is filled with a colored harmless liquid. Where the liquid is thickest, the color is deepest. Measurements are made of the depth of color, and from this is determined the deviation of the eye from the fitting standard, and the lenses for permanent use are made accordingly.

Science News Letter, August 16, 1941

Making of Shells Speeded

QUICKER manufacture of bodies for high explosive shells, with less waste of metal, is among the advantages claimed by Claude A. Witter of Philadelphia for his process, protected by patent 2,251,094. In the usual process for producing a shell, a steel billet or blank considerably larger than the finished product is turned down to proper size, and pierced with the cavity for holding the TNT. In the Witter process, a blank is cut off a bar of stock size, somewhat greater in diameter than the designed caliber and considerably shorter. The inner cavity is pierced, larger than its intended final size. Then the blank is cross-rolled, decreasing its diameter and increasing its length. Relatively little final grinding or turning is required to bring it accurately to caliber, the inventor claims.

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Gas in the Wing-Tips

MORE efficient chemical warfare, whether against crop pests in time of peace or against enemies in war, is the claim advanced for his invention by John F. Haberlin of Seattle, who has assigned his patent (no. 2,250,762) to the Boeing Airplane Company.

Airplanes now discharge chemicals, whether plant-protecting poison dust, concealing smoke, or military poison gas, from containers mounted outside the fuselage. This has a triple disadvantage, the inventor points out. The container, even if streamlined, puts a drag on the plane. The discharge stream is churned up and scattered by the propeller slipstream. Finally, some of the gas may be sucked back into the fuselage, to the detriment of the crew.

Mr. Haberlin gets around these difficulties by putting his chemicals into a number of cylindrical flasks, slender enough to be carried within the wing-tips of the plane. This does away with external parasitic drag, gets the discharge stream well clear of the slipstream, and protects the plane and its personnel from possible suck-backs of the gas.

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The *first theater* in America is to be reconstructed in Williamsburg, Virginia.

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ZOOLOGY

NATURE RAMBLINGS
by Frank Thone

What Is a Worm?

"WORM," to most of us, conjures up first of all an image of the humble, wriggling creature that we spear on a fish-hook, or see a luckless prey in the beak of a robin, or find drowned out of its burrows, by hundreds, in summer rain-showers. So familiar is this figure that we usually call the creature just "worm" and let it go at that. Prodded, we may consent to qualify it as angle-worm, fish-worm, earth-worm or rain-worm.

But zoologists will not admit that it is a worm at all! To them it is an annelid, an evolutionary cut or two above the true worms, which they call helminths. True worms, zoologists tell us, don't have those little rings around their bodies. They are smooth, slippery, slender creatures, exemplified by the vinegar-worms (vinegar-eels) sometimes found in a cruet that has stood too long, or the eelworms that attack the roots of plants. True worms also are the queer, creeping flatworms sometimes found in wet places, and (less agreeably) the worms that make life miserable for Towser and Tabby, and even occasionally for ourselves.

However, if you ask an etymologist, he will tell you that the zoologist's notions are all wormy. "Worm" originally meant serpent, in the old Saxon vocabulary. Hence, it also meant dragon, for that imaginary monster had a good deal of the serpent about him.

An entomologist, being of the zoological clan, will take issue with the etymologist. Still, he'd prefer not to have the various "worms" that have been wished into his bailiwick by common usage. Any wriggling, immature insect is likely to be called a worm. We have grub-worm, cabbage-worm, tobacco-worm, inch-worm, caddis-worm, screw-worm and a hundred other "worms" that are really maggots or larvae, destinued to grow up into insects.

The same tendency to look upon any cylindrical, wriggling object as a worm is responsible for the naming of the slow-worm and blind-worm, which are really limbless amphibians, related to frogs and salamanders. They are usually mistaken for snakes by their infrequent finders. Similarly, the destructive boring animals that cause tremendous losses to marine piling, wooden ships' bottoms and other timbers immersed in salt water have become known as ship-worms, although they are really mollusks, related to oysters and clams.

Well then, *you* answer: What is a worm?

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● Earth Trembles

Information collected by Science Service from seismological observatories resulted in the location by the *U. S. Coast and Geodetic Survey* of the following preliminary epicenters:

Saturday, August 2, 6:41.5 a.m., EST

In the Pacific Ocean, near Kermadec Island, about 700 miles northeast of New Zealand. Latitude, 30 degrees south. Longitude, 179 degrees west. Strong shock.

Wednesday, August 6, 1:15 a.m., EST

In the Pacific Ocean, off the coast of the Alaska peninsula. Latitude, 54.5 degrees north. Longitude, 160 degrees west. Strong shock.

For stations cooperating with Science Service, the Coast and Geodetic Survey, and the Jesuit Seismological Association in reporting earthquakes recorded on their seismographs, see SNL, July 19.

MEDICINE

Two-Party Political System Prescribed for AMA

Physicians Urged to Encourage Differences of Opinion And To Make Contests Respectable and Honorable

LATEST diagnosis of the American Medical Association's ailments is made by Oliver Garceau, Harvard University instructor in government, who gives a detailed and revealing case report, makes a hopeful prognosis and writes a prescription for three rather drastic medicines in his book, *The Political Life of the American Medical Association* (*Reviewed, SNL, this issue*).

"In internal politics the AMA is not mortally ill; it is suffering from a chronic disease, dangerous only if too long neglected," is Mr. Garceau's prognosis.

His prescription for cure of the ailment calls for: 1. More politicians within the organization, not less; 2. Abandonment of the present insistence on a united group with one mind and one voice; 3. Organization of a two-party political system within the organization or at least allowing organized contests for power within the group to be "brought to the surface, made respectable and honorable."

AMA members who want the organization to survive must learn to deal with the active political minority within the group, "not to accept them passively or go on a campaign to scalp them all," Mr. Garceau declares. The taboo against medical politicians must be cast out and more politicians developed.

AMA dislike of washing its dirty linen in public is understandable, says Mr. Garceau, but there has been too great a tendency to handle all differences of opinion as dirty linen, he charges. Many constructive proposals for handling serious problems confronting the association have been treated as if they were dirty linen and buried or somehow killed by the powerful reference committees.

The Committee of Physicians, which Mr. Garceau shows up as a vague and ineffectual body, might have developed the two-party system within the AMA, he thinks.

"The AMA owes to itself and to the public a better performance than it has recently achieved," he concludes. "It will be a tragedy for the whole community if the AMA fails to elicit public respect. The answer lies in the political life within the AMA itself."

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The *United States* normally uses about 60% of the worlds rubber production, 40% of the nickel, 40% of the tin, 45% of the chromium.

● RADIO

Thursday, August 21, 2:45 p.m., EST

On "Adventures in Science," with Watson Davis, director of Science Service, over Columbia Broadcasting System.

John H. Baker, executive director of the National Audubon Society, will describe the work of the Society and of the Audubon Junior Clubs that are forming in America.

Listen in each Thursday.

•First Glances at New Books

MILITARY SCIENCE

MILITARY SCIENCE TODAY — Donald Portway—*Oxford Univ. Press,* 157 p., illus., $1.75. An excellent general exposition of the art of war in its modern development, this book should be read by everyone trying to follow the daily news dispatches with reasonable intelligence. Since the author is an English officer, and the illustrative materiél is mainly British, the information obtainable here is especially pertinent and abreast of the times.

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POLITICAL SCIENCE

DEFENDING AMERICA'S FUTURE—Ernest Minor Patterson, ed.—*Amer. Academy of Political and Social Science,* 228 p., $2. (The Annals, Vol. 216, July, 1941.) See page 108.

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ANTHROPOLOGY

CULTURE ELEMENT DISTRIBUTIONS: XIII, NEVADA SHOSHONI—Julian H. Steward—*Univ. of Calif. Press,* 150 p., $1.50.

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ANTHROPOLOGY

CULTURE ELEMENT DISTRIBUTIONS: XIV, NORTHERN PAIUTE—Omer C. Stewart—*Univ. of Calif. Press,* 85 p., 75 c.

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EDUCATION

THE LITERATURE OF ADULT EDUCATION —Ralph A. Beals and Leon Brody — *American Association for Adult Education,* 493 p., $2. Intended for the serious student, this study provides references arranged in a number of subdivisions, with explanatory text to orient the student. With the exception of a few references to Great Britain, the book confines itself to America's experiences and problems in adult education.

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MEDICINE

THE POLITICAL LIFE OF THE AMERICAN MEDICAL ASSOCIATION—Oliver Garceau—*Harvard Univ. Press,* 186 p., $2.50. See page 111.

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ANTHROPOLOGY

BY THEIR WORKS, Illustrated from the Collections in the Buffalo Museum of Science—H. Phelps Clawson — *Buffalo Society of Natural Sciences,* 236 p., illus., $4. Any one reading this attractive handbook on human civilization, and seeing how the illustrated museum objects bring the past to life, is likely to have a better understanding of what museums are all about. Mr. Clawson, one of the Buffalo Museum's internes, has briefed the panorama of ancient and present day cultures for busy people and many of the 107 illustrations should be useful to art and archaeology students, as well as to busy readers.

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LITHOGRAPHY

PHOTO-OFFSET LITHOGRAPHY—Donald Nicholson—*Chemical Pub. Co.,* 154 p., illus., $3.50. A very practical book, intended particularly for apprentices who lack a scientific background, but wish to learn more about the principles of this important method of reproduction.

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CHEMISTRY

ORGANIC CHEMISTRY WITH APPLICATIONS TO PHARMACY AND MEDICINE—Eldin V. Lynn—*Lea & Febiger,* 410 p., $4.50. Besides giving an adequate discussion of the important principles of modern organic chemistry, this text uses particularly, as illustrations, the compounds that come into medical and pharmaceutical practice.

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GEOLOGY

AN INTRODUCTION TO PHYSICAL GEOLOGY, With Special Reference to North America (4th ed.)—William J. Miller—*Van Nostrand,* 465 p., illus., $3.25. New edition of a successful textbook by the head of the geology department at the University of California, Los Angeles.

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ASTRONOMY—JUVENILE

SO THAT'S ASTRONOMY!—R. Ray Baker —*Reilly & Lee,* 126 p., illus., $1. Astronomy for boys and girls, told to Bobby and Julia by the old professor (who knows almost everything).

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ANATOMY

THE PLAGIOSTOME HYPOPHYSIS, GENERAL MORPHOLOGY AND TYPES OF STRUCTURE—Harry Waldo Norris—*Published by author, Grinnell College, Grinnell, Iowa,* 91 p., illus., $1; 50c. paper. An exceedingly well worked out study in comparative anatomy. The hypophysis in selachians appears to vary as fantastically as the outer forms of the animals themselves. Students of phylogeny should find material of interest in this monograph.

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HYGIENE

START TODAY, Your Guide to Physical Fitness—C. Ward Crampton; Illus. by Nathan House—*Barnes,* 224 p., $1.75. How to exercise is the theme of this book, particularly directed at Americans who "have grown soft in many ways." Detailed directions for exercises, coordinated with proper medical supervision are given by the author who is a leading New York physician and formerly director of the New York Board of Education's Department of Physical Education and Hygiene.

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ECOLOGY

ECOLOGY OF THE COYOTE IN THE YELLOWSTONE—Adolph Murie—*Govt. Print. Off.,* 206 p., illus., 30c. (National Park Service Fauna Series No. 4). Because of certain special conditions necessary in the management of wildlife in a national park area, animal relations are never quite natural. This study makes an interesting evaluation of the reactions of one important species of carnivore to environmental conditions both natural and modified.

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MATHEMATICS

A MATHEMATICIAN'S APOLOGY—G. H. Hardy—*Cambridge (Macmillan),* 93 p., $1. Intended for the non-mathematician, this little book by a distinguished scholar of Cambridge University, is an account of what mathematics has meant to him as a man.

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AERONAUTICS

THE BOYS' BOOK OF MODEL AEROPLANES (4th ed.)—Francis A. Collins—*Appleton-Century,* 262 p., illus., $2. This latest edition of a book which gave many presentday fliers their introduction to aeronautics includes much new and advanced information.

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ECONOMICS

LABOR AND NATIONAL DEFENSE—Lloyd G. Reynolds and The Labor Committee —*Twentieth Century Fund,* 130 p., $1. A discussion of labor problems which have developed as a result of the accelerating program of national defense production, based on facts gleaned by Mr. Reynolds and the staff of the Twentieth Century Fund, together with a program recommended by the Fund's Labor Committee.

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